# Streaming Contents and RSS Feed in a Pedagogical Environment

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**Abstract:** A group of university teachers have been developing several contents using streaming technology, since it promotes the support of pedagogical activity as a dynamic resource and due to the fact that is oriented to a model of shared learning contents. Now, a new challenge can be stated: the share and the reutilization of these learning contents. Apart from being an enhanced experience only concerning the sharing of knowledge, it promotes a desired partnership inter/intra-department. In this context the RSS technology introduces a new dimension in the access to streaming media contents. The RSS is a format to syndicate contents enabling users to be aware of new contents that are periodically published. The RSS technology, through the use of RSS Aggregators or RSS Readers, help the user to keep up to date all their favourite information sources that provide their contents as RSS feeds. In the scope of the streaming media contents the definition of RSS feeds enable the students to be up to date of new educational resources that are provided by the teacher. Therefore the students instead of checking the updates that are published in several educational information resources can locally see the new resources that are described and provided in the RSS feed. Some preliminaries results are presented and discussed.

**Keywords:** Integrated and Flexible Learning Contents, RSS and Streaming Technology

## 1. Introduction

The educational restructuring introduced by the Bologna Model, guided the philosophy of the higher education for models more centred in the student. At the same time, the ubiquitous use of the Internet, followed by the evolution of information technologies and communication introduces a new challenge to education organizations. From the intersection between pedagogy and technology ought to generate innovative strategies resulting in competitive advantages to Universities in order to stimulate distinct public independently of their interests and geographic locations.

Combining Jurow's perspective that "technological advances, heightened student expectations, shifting student demographics, stakeholders demands for accountability, and new vehicles for educational delivery are all current challenges driving the need for innovation in higher education" [1] with Garrison's (et al.) stating "the majority of student time, in all forms of education is consumed by interaction with educational contents" [2], streaming presents a new way to consume knowledge, from which results the importance to explore its interaction with technologies that can offer unarguably quality and up to date support. In this context the Really Simple Syndication or RDF Site Summary (RSS) technology associated to academic contents fulfils the objectives purposes. The RSS functionality provides the refreshment of the references module, allowing the student to stay connected to the updated contents.

Throughout the article we aim to highlight the resulting advantages from the use of RSS technology associated with the streaming of academic contents. Bringing RSS technology to these contents enhances its rapid distribution and dissemination. On the other end, streaming presents itself as an ideal support of information to promote a rich interaction between students and contents.

## 2. Streaming Overview

Streaming is defined as the act to transmit multimedia content, such as video, audio or both, to be consumed, in a given moment, by a client in real time [3]. It should be noted that we are exclusively focusing on streaming technologies for content distribution supported by computer networks. Likewise, there are different types of streaming technologies, such as television and radio, but they are not relevant in the present context. We can say that what promotes this rapid proliferation and leads to new business opportunity for organizations were the fast grow of the Internet [4]. With this insight in mind, we will analyze these streaming technologies over the Internet.

Generally and just like Ethrenwerth (et al.) describes, it takes a lot of different hardware and software [5] to present an audiovisual content. This process requires the know-how of multiple technologies and competences for its producers and consumers interested in streaming contents. Fortunately, the fast evolution of the software, in its easy-of-use, and nowadays processors capacity reduce the barriers to author and publishers of these types of e-contents.

## 3. RSS Overview

RSS is a format specified in XML to syndicate Web contents. RSS is primarily used for relaying the latest entries' headlines, weblogs and podcasts (multimedia files) [6]. However, it has been adapted to a wide range of uses in the description of web contents, to enhance the rapid dissemination of the contents. These purposes include journalism, marketing, bug reports, syndicating tables of contents for serials publications, education resources or any other activity involving periodic updates or publications [7].

RSS has been suffering different denominations and multiple versions numbers with related specifications developed by separate groups. In fact, the names are misleading because the two formats differ not only in the specification and version number but also in implementation. The Really Simple Syndication (RSS 2.0) and the RDF Site Summary (RSS 1.0) specifications were developed by two different and independent working groups. The RSS 1.0 is an XML application, which conforms to the World Wide Web Consortium's (W3C) RDF specification and is extensible via XML-namespace and/or RDF based modularization [8]. The RSS 2.0 documents must conform the XML 1.0 specification, as published on the W3C [6]. This multiple version numbers do not reflect a lineage [7]. In fact, the RSS 2.0 is not an extension of the RSS 1.0. Two different and independent working groups developed the specifications of these two formats. The RSS-DEV Working Group [9] is responsible for the RSS 1.0 developments, while Userland Software assigned the ownership of the RSS 2.0 specification to the Harvard's Berkman Center for the Internet & Society [10].

However, the similarities outweigh the differences between the various versions [7]. In fact, they all provide specifications for an XML document, which is called RSS feed.

An RSS feed is composed by a list of items containing title and links, and optionally, can include descriptions and other terms available in the information source web page which can be subscribed by any user. To read the RSS document and the new entries published, the user just needs to install an RSS aggregator or an RSS reader, which handle applications that alert users when new content is detected on an electronic source by means of changes to the RSS feed.

In the next section is presented the use of the RSS technology in the context of the learning contents.

## 4. The Use of the RSS Technology to Syndicate Streaming Contents

The development of the information and communication technologies has been promoting the definition of sophisticated mechanism to develop and distribute, in different formats, the educational contents produced by the teachers and used by the students.

The use of RSS technology is not restricted to Computer Science users. In fact RSS files can be easily read and understand by common users, and therefore has been encouraging its rapid adoption in various areas. But RSS's simplicity hides its power. The adoption of the RSS in the context of learning contents enables the creation of valuable services that span domains of knowledge.

In the context of the learning contents, the RSS technology introduces a new dimension to the currently processes used to access and distribute the streaming media contents. The teachers produce the learning contents and then structure as a RSS feed, which includes a list of the items containing titles and links, and optionally descriptions and other terms of a set of learning contents. Following the definition of the RSS feed, this is made available on a web server and the students are able to subscribe the RSS feed accordingly to its preferred schedule, and be aware of new learning contents developed and available by the teachers. The use of the RSS technology in the description of the learning contents support the organization of the educational materials created by the teachers, and therefore improves the pedagogical activity and promotes the share of learning contents.

In fact, the use of streaming technology in the preparation and development of learning contents in addition to the contents' description as an RSS feed enabling it syndication, turns the RSS ideally suited to promote the rapid access and dissemination of the new contents published by the teachers and helping the students to keep up to date all their favourite information sources.

The RSS technology and the streaming technology ideally combine on the collaboration, simulation, classroom management, and information collection and dissemination. The combination of the RSS approach used in the description of the learning contents enabling the syndication of the RSS feed, with the use of the streaming technology in the development of the same learning contents introduces a new challenge in the current pedagogical methodologies, enabling to students different mechanisms to acquire knowledge.

## 5. The Case Study

In nowadays, the life long learning is an increasing phenomenon and a need to be updated. Competitive professionals have to answer to continuous requests and changes on their professional life. The perspective of opening universities with new forms to teach and to learn, based on more flexible educative models, through the use of the technologies, will be able to encourage new public until then

difficult to capture. The research project developed was based on the use of streaming contents, implemented in different levels of study. This experience involved the participation of students and teachers of different subjects and courses from University of Minho. Additionally it was used the RSS technology to syndicated the streaming contents developed. One of the inherent motivations in the development of this work is the fact that the presentation of the contents in streaming and implemented in a blended learning environment will be able to positively answer to this ideal.
The technologies involved from the conception towards the implementation of the modules in streaming are defined in the following subsections [11].

## *5.1 Technologies used in the Conception*

The application used in the conception of video-streaming contents was Microsoft Producer, a free access program that requires PowerPoint 2003. Different types of files can produce the streaming contents, depending on the final use: video (avi, mpeg, wmv, asf), power points, audio (wav, mp3, wma), images (jpeg, gif, tif), and HTML documents. Figure 1 illustrates the interface of the Microsoft Producer.

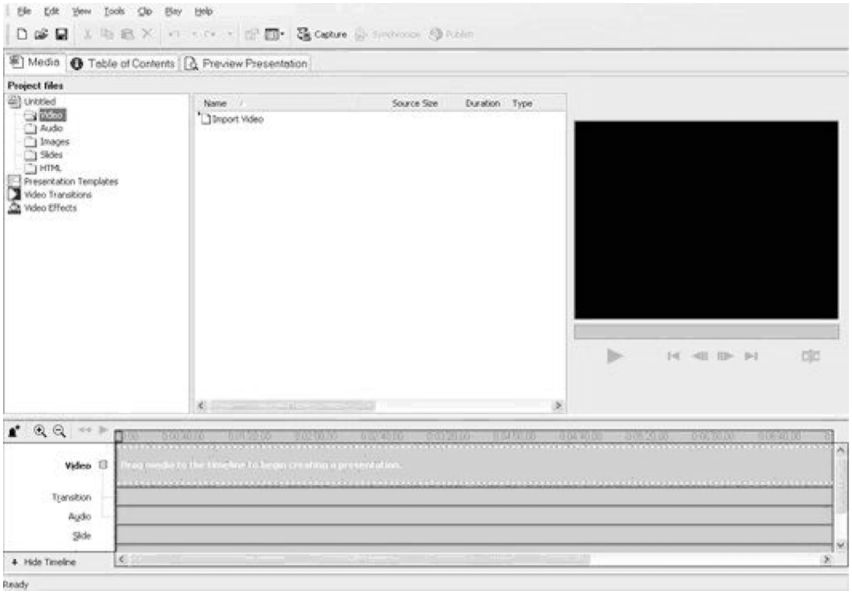


Figure 1 Microsoft Producer interface.

After editing the different contents used in the timeline of the Microsoft Producer, the author must synchronize the contents used to publish them later.

## *5.2 Technologies Used in the Implementation*

After the synchronization of all the involved files, the content must be published and stored in a streaming server with HTTP (Hyper Text Transport Protocol) service. The interactivity generated by the possibility to select chapters, fast forward and backwards it is only possible through the implementation of RTSP (Real-Time Streaming Protocol) [12].

The building of pedagogical materials can then be turn available through links to the reserved space in Moodle and Blackboard platforms. This type of contents enables the teacher to perform the necessary changes in the HTML document without further changes to synchronize the remaining content, anytime the teacher considers necessary.

Depending on the public target, the teacher can reformulate the complementary activities related to a particular subject, performing the association of the new document of activities inside the establish temporization and proceed to a new publication. Accomplishing this, the teacher does not need to start the procedure from the beginning.

## *5.3 Streaming Media Contents with RSS*

With the underlining purpose of testing the functional combination of the Streaming technology and RSS technology, different thematic modules were created to stream with hyperlinks supported by RSS functionality. These modules were lectured in the Masters of Information Warfare/Competitive Intelligence under the Learning Unit of Digital Security. The teacher involved in the experiment is from University of Minho (located on the North of continental Portugal) gave those modules under a blended learning thematic to students of the University of Madeira (a Portuguese island located on the Atlantic Ocean).

The development of the modules followed the structure presented in Figure 2, with a previous work of planning and selection of themes to present in this format. The steps were taken in the following order:

A. *Summary composition of contents*.
   The selected contents were of theoretical nature, and this choice is based on two presupposed premises: they are characterized by the need to be transmitted one-way, belonging to the teacher. Secondly, they are vital because they form the knowledge base, about certain subjects that every student must obtain.

B. *Video stream creation with the teacher presenting the content*.
The video capture was made by a webcam directly connected to an encoding system. This allowed compressing the video to format that could be streamed. The presence of Microsoft technology made the codec question to one choice to ensure compatibility: WMV-Windows Media Video.
To ensure compatibility with Microsoft technology the WMV was used.

C. *Creating slides with audiovisual support*.
The synthesis of the theoretical contents was compiled in power point, in order to enable the student to accompany the exhibition recorded by the teacher in video.

D. *Activities and support bibliography*.
Activities and support bibliography with RSS feeds were added to HTML documents.

E. *A note about RSS*.
A simple note explaining how to make RSS useful to the user was made available.


Figure 2 Streaming interface of the thematic module (in Portuguese).

Finally, in order to track all students' activities, the contents were presented in a learning management system. An access counter[1] was associated with the streaming contents, to give to the teacher an idea of the students preferred schedule [13].

The modules were kept online during the entire course unit.

[1] The tool used to register accesses was Webalizer, version 2.01.

## 6. Perspectives of Students and Teachers Involved in the Experience

We built a questionnaire to understand how this new technology was been used in the conception of learning contents. Additionally, we were able analyse students acceptance levels and obtain their perspectives about the subject.

Each student was asked to answer the questionnaire at the end of the pedagogical activity. The main objective of the questionnaire was to evaluate the use of virtual classes as a complementary tool to the face-to-face classes [14]. From a sample of 172 students from Education and Engineering courses, we observed that the level of satisfaction with the performed experiences was high. The results showed a satisfaction rate of 76% (58% very satisfied and 18% strongly satisfied) in opposition to 3% of students little satisfied. The level of satisfaction in the use of pedagogical contents in streaming was very good. Nevertheless, a lower band of students manifested little satisfaction with its use. When asked to identify problems encountered during the experience, some students mentioned the limitation in the access of the materials because they do not have Internet at home. Other common observations manifested by students were the lack of privacy and appropriate resources to attend the pedagogical contents.

To obtain and to better apprehend the teacher's perspectives about the use of streaming contents, four open interviews were carried through. A list of questions were presented to the interviewers and used as checklist during the interview. Some of the teachers involved mentioned that they did not have difficulties in developing the streaming contents. One in particular mentioned, "that was not a difficulty but more an adaptation" to the new reality. Only small adjustments were needed on some of the pedagogical materials elaborated for the face-to-face classes (power points, some activities and bibliography of support). In general, all the teachers mentioned the fact that the difference between the preparations of the contents for streaming to the ones they present in normal classes is the "question of being filmed". This was the most difficult part of the work. Concerning the time spent on the developing of streaming contents, all were unanimous mentioning that "initially is more time consuming comparing to the time needed in the preparation of normal classes". Despite this, all agreed that this additional time consumption "is rapidly amortized" all over the years. One of the teachers, in a certain way, summarizes the general teacher's perspective: "the streaming obliges us to a setup time considerable (…) but that is later recovered". In general, the idea is well accepted for the interviewed teachers. The advantage is the perspective of the university opening to the public, capturing new public and new opportunities. They can also be reused in different contexts and learning scenarios. However, despite the optimistic perspective, some concerns related to copyrights must to be taken into account.

## 7. Conclusions

According to Hippel, "open and distributed innovation process driven by steadily better and cheaper computing and communication" [15], and based on the premise that discovery learning it is the one that happens just in time instead of just in case [16], we considered streaming media contents with RSS technology to be a promising challenge and to a certain degree, expected, in the evolution course of education environments.

The use of streaming academic contents has an enormous area of application, without apparent limitation to its practice. Teachers that developed their contents in streaming form and students that use streaming contents in their learning process are very satisfactory with the performed experiences. Complementing this reality with RSS technology, it transforms the contents into a learning dynamic resource and permanently up-to-date.

Taking a global perspective and from what was discussed, we feel confident to say that innovation happens in the way teaching and learning occurs upon basics principles of knowledge valorisation [13]. Expanding and feeding networks that stimulate this phenomenon, while maximizing the advantage brought by technology, establishing a natural relationship between users, learning and technology.

As future work, the extension of the development of contents in this type of approach for courses on different scientific areas is being studied. It is also being considered the possibility to provide the contents in a repository of academic contents to effectively reuse available materials. The combination of the RSS technology and the streaming technology in the conception of the academic contents to be available in repositories of educational materials will introduce a new dimension on the development, distribution and dissemination of the academic contents.

## References

1. Jurow, S., 2006. Set in Your Ways?. *In:* Bauer, R. A., Bowe-Furst, J. A., ed. *New Directions for Higher Education*. Wiley Periodicals, Inc. 2007 (137), pp. 5-14.
2. Garrison, D. R. and Anderson, T., 2003. *e-Learning in the 21st Century, a Framework for Research and Practice*. London: RoutledgeFalmer.
3. Shepard, K., 2003. Questioning, Promoting and Evaluating the use of Streaming Video to Support Student Learning. *British Educational Communications and Technology Agency*, 34 (3), pp. 295-308.
4. Rosenthal, David A., 2004. Analyses of Select Variables Effecting Video Streaming over IP. *International Journal of Network Management*, 14, pp. 193-211.
5. Ethrenwerth, C., Herman, B. and Rosser J., 2001. An Overview of Videostreaming on the Internet and its Application to Surgical Education. *In:* New Technology, Surgical Endoscopy. Ultrasound and Interventional Techniques, New York: Springer-Verlag, 15, 2001, pp. 624-629.

6. Berkman Center. (2003). *RSS 2.0 at Harvard Law* [online]. Available from: http://blogs.law.harvard.edu/tech/rss
[Accessed Jun 2005].
7. Hammond, T., Hannay, T., Lund, B. (2004). The Role of RSS in Science Publishing Syndication and Annotation on the Web. *D-Lib Magazine* [online], 10 (12). Available from: http://www.dlib.org/dlib/december04/hammond/12hammond.html.
[Accessed Feb 2006].
8. Beged-Dov, G., Brickley, D., Dornfest, R., Davis, I., Dodds, L., Eisenzopf, J., Galbraith, D., Guha, R. V., MacLeod, K., Miller, E., Swartz, A. e Vlist, E. (2000). *RDF Site Summary (RSS) 1.0* [online]. Available from: http://web.resource.org/rss/1.0/spec#.
[Accessed Jun 2005].
9. Rael Dornfest. (6 Dec 2000). RDF Site Summary 1.0 Specification Working Group [online]. Available from: http://tech.groups.yahoo.com/group/rss-dev/.
[Accessed Jun 2005].
10. Berkman Center. (2003). *RSS 2.0 at Harvard Law* [online]. Available from: http://cyber.law.harvard.edu/rss/
[Accessed Jun 2005].
11. Santos, H., Mendes, I., Leão, C. P., Dias, A., Soares, F. O., 2007. Módulos Temáticos em Streaming – Planeamento, Concepção e Implementação (Plan, Design and Execution of Streaming Thematic Modules). *Challenges2007 - V International Conference of Information and Communication Technologies in Education*, *May 2007 University of Minho, Portugal*, pp. 859-863.
12. Adão, C., 2006. *Tecnologias de Streaming em Contextos de Aprendizagem (Streaming Technologies in Learning Environments) Tecnologias de Streaming em Contextos de Aprendizagem*, Thesis (MSc). University of Minho.
13. Santos, H., Mendes, I., Leão, C. P., Soares, F. O., Silva, E., 2007. Streaming Media in Different Contexts: Engineering and Education Graduation. *IADIS International Conference, E-Leaning 2007, July 2007, Lisbon, Portugal,* pp. 327-333.
14. Santos, H., Leão, C. P., Soares, F. O., Mendes, I., Dias, A., Carvalho, J., 2007. Reusing Streaming Contents in Engineering and Education Courses. *Conference ICL 2007, September 2007, Villach, Austria*.
15. Hippel, Eric V. (2005). *Democratizing Innovation* [online]. The MIT Press. London, England. Available from: http://web.mit.edu/evhippel/www/democ1.htm
[Accessed May 2007].
16. Emily Hollis. (2006). *IBM: Learning Through Simulations* [online]. CLOmedia.com. Available from: http://www.sophia-associates.com/metis/IBM_and_Simulations.pdf
[Accessed Dec 2006].